



(12) **EUROPEAN PATENT APPLICATION**

(21) Application number: **92109429.8**

(51) Int. Cl.⁵: **G02B 6/44**

(22) Date of filing: **04.06.92**

(30) Priority: **15.06.91 DE 4119829**

(43) Date of publication of application:
17.03.93 Bulletin 93/11

(64) Designated Contracting States:
**AT BE CH DE DK ES FR GB GR IT LI LU MC
NL PT SE**

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(54) **Device for dividing optical fibre cables and wires.**

(57) A device is described for dividing optical fibre cables and wires, comprising a housing body, a spliced fibre cassette, a reserve fibre storage means for example an organiser and connections for coupling subscriber lines. Dividing and distributing means (10, 23) for passing optical fibre wires (8') out to further distributing devices and also similar means for connecting optical fibres wires (8a) to subscriber connection sockets (23) are provided in a single common housing (2, 3). The device is easy to mount and allows easy manipulation of the glass fibres therein.

The user can choose between the connection of further devices or subscriber lines without alterations to the device being necessary.

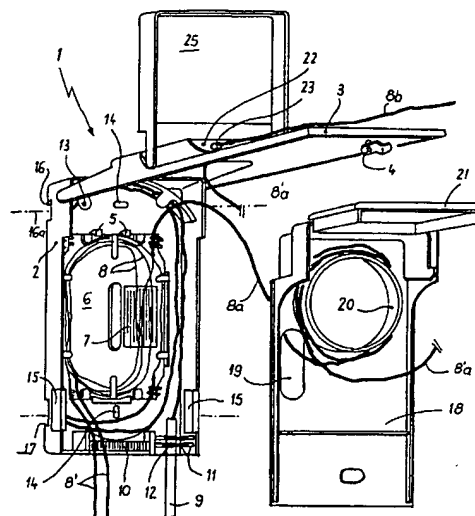


Fig. 1

The invention relates to a device for dividing optical fibre cables and bundles, comprising a basic housing body, a means for locating a fibre splice, such as a fibre splice cassette, an organiser for holding reserve cable or fibre pigtails, and connections for coupling to subscriber lines.

Many designs of such dividing devices are known. One such device for connecting to a subscriber line is described in EP-0288808 A2. It comprises two hinged mating housing planes, one containing a splice plate for the fibres, and the other containing a working reserve of cable.

A drawback of the known devices is that it is not possible to connect further dividing devices or subscriber lines selectively to those devices.

Devices for distributing optical fibres of cables are also known. For example, US 4717231 describes a distributing box for optical fibres comprising a pivotable panel dividing the box into two compartments. Connectors connect a first optical fibre (of a cable passing through holes in a wall of one of the compartments) to a second optical fibre (of a cable passing through holes in a wall of the other of the compartments).

Other known solutions are described in DE-3806136, DE-3428615, and GBM-8109413.

Compared with the known solutions, the problem of the present invention is to simplify the mounting of the device itself and, especially, the manipulation of optical fibres. A particular objectives of the invention is to enable the user to make connections to further dividing devices or to individual subscriber lines using a single device, without having to make any alterations to the device. The device of the present invention can therefore, in a single device, act as a distribution device (i.e. making connections to further dividing devices) or as a termination device, (e.g. making connections to individual subscriber lines or appliances), or both.

The problems of the prior art are therefore solved according to the invention by means of the fact that dividing and distributing means for passing optical fibres or fibre bundles out to further distributing devices, and for connecting optical fibres or fibre bundles to subscriber connection sockets are provided in a common housing.

The present invention provides a device for dividing optical fibre cable and/or fibre bundles comprising:

- (a) a housing body;
- (b) a means for locating a fibre splice;
- (c) a means for storing reserve fibre; and
- (d) connections for coupling to subscriber lines,

characterised in that both a distributing means, provided for passing optical fibres or fibre bundles out to further distributing devices, and a distributing means, provided for passing optical fibres or fibre

bundles to subscriber connection sockets, are provided in the same housing.

The means for locating the fibre splice may be any typical means known to the man skilled in the art, for example a splice cassette. The means for storing reserve fibre is typically an organiser whose function is, for example, to store reserve fibre loops, or fibre pigtails, that is fibres the ends of which are prepared for connection to a subscriber sockets

Using the invention, it is possible to connect selectively further distributor housings or subscriber lines. These operations can be carried out not only as alternatives, that is to say either or, but also simultaneously. The design is such that even in the event of subsequent changes to the connections, the connections that have already made do not have to be altered.

The splice holding means, e.g. a splice cassette, is preferably pluggable into the basic housing body without fastening means.

In the fibre optic distributing devices in which fibres are spliced, it is usual to include reserve lengths of fibre in the device in order, *inter alia*, to aid manipulation of the fibres during the splicing operation. These reserve lengths are generally stored as loops of fibres in the housing body. Storage means, often known as an organiser, are typically provided to hold the loops in place. According to the present invention the reserve fibre lengths, or at least some of the reserve fibre lengths, are preferably stored in a storage means (e.g. an organiser) that is a separate tray the base of which separates the splice region from the storage region. This is believed to be novel *per se*.

A second aspect of the invention therefore provides a device for dividing optical fibre cable and/or fibre bundles comprising:

- (a) a housing body;
- (b) a means for locating a fibre splice; and
- (c) a means for storing reserve fibre,

characterised in that the means for storing reserve fibre is provided as a separate tray so that in use, the tray separates the region of the fibres that are spliced from the stored reserve fibre

Spare fibre may be stored on one or both sides of the splice. In a preferred embodiment according to the invention, fibre on the side of the splice that leads to the subscriber connection is stored on the loose organiser tray. Fibre on the other side of the splice is stored in the base of the housing, i.e. in the same compartment as the splice holding means

In preferred embodiment the housing body has a closure lid, and when the lid is open a separate, loose, organiser tray, or reserve fibre storage means can be placed in the housing body, which can be held in place in the housing body by

closing the lid of the housing body. The loose fibre storage means may be substantially the same size as the base of the housing body, so that it substantially covers that base. As an alternative, the storage means may be in the form of a tray provided with a hinge that can cooperate with the housing. Thus the fibre storage means may be a tray detachably hinged to the housing.

Preferably, where a closure lid is provided, it is provided with subscriber connection sockets.

By using the device according to the invention, all splicing operations and the like in the region of the splice holding means (e.g. the splice cassette) can be carried out first of all. These are typically carried out by lifting the cassette away from the device into a splicing machine, in which fibre splicing is carried out. The splice holding means can then be fixed in place, in the housing body, which may be mounted for example to a wall or in a switch cabinet. The reserve fibres or fibre pigtails can subsequently be secured to the fibre storage means or organiser, which in turn can be fixed to or within the basic body. Finally the connections of the fibre pigtails to the subscriber sockets can be made. Since the organiser or fibre storage means is either loose or detachably hinged to the housing it can easily be removed. Therefore every easy working of the splice region is possible, and no additional clamping or fixing means are required during the work phase, since all required fixing means are being provided directly by the device itself. Handling is therefore easier than in prior art devices such as EP-0288808.

Preferably the fibre storage means or organiser is provided with winding supports for the reserve fibre(s) or pigtail(s). The winding supports can take the form of pipe pieces, winding lugs or winding pins around which the lengths of reserve fibre or the pigtails can be wound to provide a reserve.

Advantageously, when in position in the housing body, the organiser or the fibre storage means can be fastened to the housing by means of a lock. The lock may be provided in the closure lid so that, when the lid is closed, all of the regions of the device that are not the concern of the subscriber or end-user are locked.

In order to retain the fibres or fibre pigtails within the housing after they have been wound onto the organiser or holding element, the separate organiser or reserve fibre storage means may itself be provided with a lid. This organiser lid may be within the outer contour of the housing body. This separate lid region may, but preferably may not, be opened by the subscriber or end user. Alternatively the reserve fibre storage means may be provided with clamps to hold the fibre thereon. In this case a single housing lid is sufficient.

Preferably the housing body also is provided with supports around which sections of both the incoming and outgoing optical fibre cable and/or lengths of reserve fibre can be wound.

The housing body preferably also comprises at least one distributing comb for incoming or outgoing cables. The use of a distributing comb for outgoing cables is especially advantageous when lengths of optical fibre cables are passed from the splice holding means (e.g. splice cassette) out of the basic body directly into adjacent housing bodies of similar devices, where two or more devices are arranged side by side.

The entries and outlets for incoming and outgoing cables may be provided on different sides of the housing body. These entries can be opened or closed on site, for example by means of plug-in closures, depending upon the requirements.

Where the subscriber connection sockets are provided on the housing closure lid, a further cover which is hinged to the closure lid itself may be provided to protect the socket. This may or may not be lockable from the subscriber.

For some applications, it is desirable to be able to mount a plurality of devices side by side. To achieve this the housing body is preferably provided, on one surface, with at least one dovetail guide or the like which can be placed over a mounting rail on a wall or the like.

In order to make exact positioning possible, whether it be on mounting rails or on a mounting surface, the base of the housing body may also be provided with elongate mounting holes arranged at 90° to each other.

Preferably the entry region of the optical fibre cables into the housing body are provided with fixing projections for the attachment of clamping and strain-relief means for the incoming optical fibre cable.

The invention is described in detail below, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a three-dimensional view of the device of the invention, in its open state, with the reserve fibre storage element displaced from its mounted position;

Figure 2 shows a detail of the cover region of the device of Figure 1 showing the subscriber sockets in the device;

Figure 3 is a plan view of a partial region of the reserve cable holding element, and

Figure 4 shows a section approximately along the line IV-IV in Figure 3.

The device according to the invention, generally designated 1, comprises a basic body 2 which can be closed by closure lid 3 which is hinged thereto and has a lock 4. It also comprises a splice holding means in the form of a splice

cassette 6 and a reserve fibre storage means in the form of an organiser 18, which are both detachably mountable or hingeable in the basic body 2.

As shown in Figure 1, the splice cassette 6, which is known *per se*, is snapped into the basic body 2 by means of clamping elements 5. It is otherwise free from fastening means. The splice cassette 6 has a distributing comb 7 for the optical fibres 8 of the incoming optical fibre cable 9. In the figures the thin and thick lines of fibres represent primary and secondary coated fibres respectively. Such coatings are known to the man skilled in the art.

Figure 1 shows that there is provided in the lower region of the basic housing body 2 a distributing and fixing comb 10 for incoming and outgoing optical fibres 8'. These, for example, may be introduced into, or come from, adjacent further devices 1 (not shown).

In order to fix the incoming optical fibre cable 9, slots and fixing projections 11 are provided in the housing so that the incoming optical fibre cable 9 can be fastened there with plastic fixing loops 12.

Figure 1 also shows that the basic housing body 2 also has winding supports 13 for reserve lengths of optical fibre or alternatively for fibre bundles on the incoming side of the splice region.

For mounting the device on a wall or the like, elongate holes 14 oriented at 90° to each other are provided in the base region of the housing.

In order to be able to position the distributing comb 10 at other points in the housing 8, further apertures are provided in the side walls of the housing. These are closed by plug-in pieces 15 as shown in Figure 1. Also shown in Figure 1, in the upper region (as drawn) of the base of the housing body 1, is a dovetail guide 16 and, in the lower region, likewise guide recesses 17. The guides 16 and 17 allow several of such devices to be fastened side by side on mounting rails, on a wall or the like.

A special feature of the present invention resides, *inter alia*, in the separate means for holding reserve cable, the organiser 18. This is shown displaced from its mounted position in Figure 1 in order to reveal the components of the device. Pig-tails of fibre held by that element are designated 8a in Figure 1. Fibre leading to the subscriber from connection socket 23 bears the reference numeral 8b.

The reserve fibre storage means or organiser 18 has a through-opening 19 for passage of the pigtails 8a and winding supports 20 which, in Figure 1, are in the shape of a short section of a pipe.

In order to prevent the pigtails 8a from coming loose after they have been wound around the winding supports 20, there is provided, in the embodiment shown in Figure 1, a lid 21 for the reserve

fibre storage means or organiser 18 which can be folded down over the stored fibre. When folded it covers the winding supports 20 at least in part, in such a manner that the pigtails 8a are not able to escape. The invention is not however, limited to this method of retaining the pigtails 8a.

The overall closure lid 3 of the device has, in the example shown, a mounting surface 22 for holding subscriber connection sockets 23. The pig-tails 8a can be inserted into these connection sockets 23 from within the device. Then customer connection lines 8b can be connected to the connection sockets 23 outside the device 1. In Figure 1 pigtail 8a' is shown cut off by double lines, leading directly from the splice cassette 6 via the wound reserve of the organiser or holding element 18 to the subscriber connection socket 23 shown in Figure 2. (Dieter, what is the purpose of the reserve-to give extra length for connection to customer?).

Figure 2 shows the mounting region of the subscriber connection socket 23 in the lid 3 of the device of Figure 1. The connection line 8b to the subscriber has a plug 23a. Plug 23a can engage in the socket 23 in the housing lid 3. The mounting region can be protected by means of a cover 25, which is indicated by broken lines in Figure 2. This cover 25 may be locked against the subscriber.

Figures 3 and 4 show a plan view and a section, respectively, of the organiser or fibre storage means 18' having a closure lid 3' arranged in the forward region which is provided with a lock 4. In this case, for simplicity of design, there is no separate lid covering the fibre storage means 18 (i.e. no separate lid 21 as in Figures 1 and 2).

The fibre storage means 18' shown in Figures 3 and 4 is provided with a plurality of pins 24 arranged in pairs and, optionally with a relatively thin oval support ring 20, and/or a correspondingly shaped opening. The wires can be passed through that opening 20', or through an insertion opening 19', which is also indicated in the Figure. Since there is no separate lid 21 covering the fibre storage means 18, additional clamps may be provided to retain the fibre.

The embodiment described above can be modified in various respects without departing from the underlying concept. For example, as described depending upon the method by which the pigtails can be fixed, the lid region 21 on the fibre storage means 18 can be omitted. In that case, the closure lid 3 is made larger in that region. If the closure lid 21 is provided, it can have support shoulders for the closure lid 3 in the closed position. It may also be provided with means against which closure lid 3 can be locked.

Instead of the dovetail guide 16 used to mount the device 1 on rail on a wall or the like, it is also possible to provide on the base region of the basic

body 2 an inclined support shoulder. This may be used to effect locking in one direction. For horizontal orientation, fastening holes can be provided in the holding rails. The lower opening 17 can be made larger than the width of the holding rails to enable the housing to be oriented perpendicular to those rails. Owing to the arrangement of the openings 16 and 17 or the elongate holes 14 in the base of the housing, the housing can easily be oriented both horizontally and vertically.

Claims

1. A device for dividing optical fibre cable and/or fibre bundles comprising:
 - (a) a housing body;
 - (b) a means for locating a fibre splice, preferably a splice cassette,
 - (c) a means for storing reserve fibre; and
 - (d) connections for coupling to subscriber lines,
 characterised in that both a distributing means (10), provided for passing optical fibres for fibre bundles (8') out to further distributing devices, and a distributing means (23), provided for passing optical fibres or fibre bundles (8a) to subscriber connection sockets (23), are provided in the same housing.
2. A device according to claim 1, characterised in that the means for storing reserve fibre (18) is a separate tray for holding reserve lengths of optical fibre (8a), and is itself detachably mountable in the housing body (2).
3. A device according to claim 1 or 2 comprising a closure lid (3) comprising a subscriber connection socket or sockets (23).
4. A device according to claim 3, when dependent on claim 2, wherein when the closure lid (3) is closed it fixes the means for storing reserve fibre 18 in position in the housing; and wherein a lock (4) is preferably provided, preferably in the closure lid (3') to lock the lid in the closed position.
5. A device according to any one of the preceding claims, characterised in that the means for storing reserve fibre (18) is provided with its own lid (21), which lies within the outer contour of the basic housing.
6. A device according to claim 5, when dependent on claim 3 or 4, characterised in that when the closure lid (3) of the housing body is closed, the lid (21) of the organiser is also fixed in its closed position.
7. A device according to one of the preceding claims, characterised in that the housing body (2) is provided with at least one distributing comb (10) for incoming and outgoing cables (8',9).
8. A device according to claim 7 or one of the preceding claims, characterised in that entries and outlets for incoming and outgoing cables (8',9) are provided on different sides of the housing body (2).
9. A device according to claim 3 or any claim dependent thereon, characterised in that a further cover (25), which is hinged to the closure lid (3) of the housing body is provided for covering the subscriber connection sockets (23) on the housing body lid (3).
10. A device according to any one of the preceding claims, characterised in that fixing projections (11) for the attachment of clamping and strain-relief means for an incoming optical fibre cable (9) are provided.
11. A device for dividing optical fibre cable and/or fibre bundles comprising:
 - (a) a housing body;
 - (b) a means for locating a fibre splice; and
 - (c) a means for storing reserve fibre
 characterised in that the means for storing reserve fibre is provided as a separate tray so that in use, the tray separates the region of the fibres that are spliced from the stored reserve fibre.

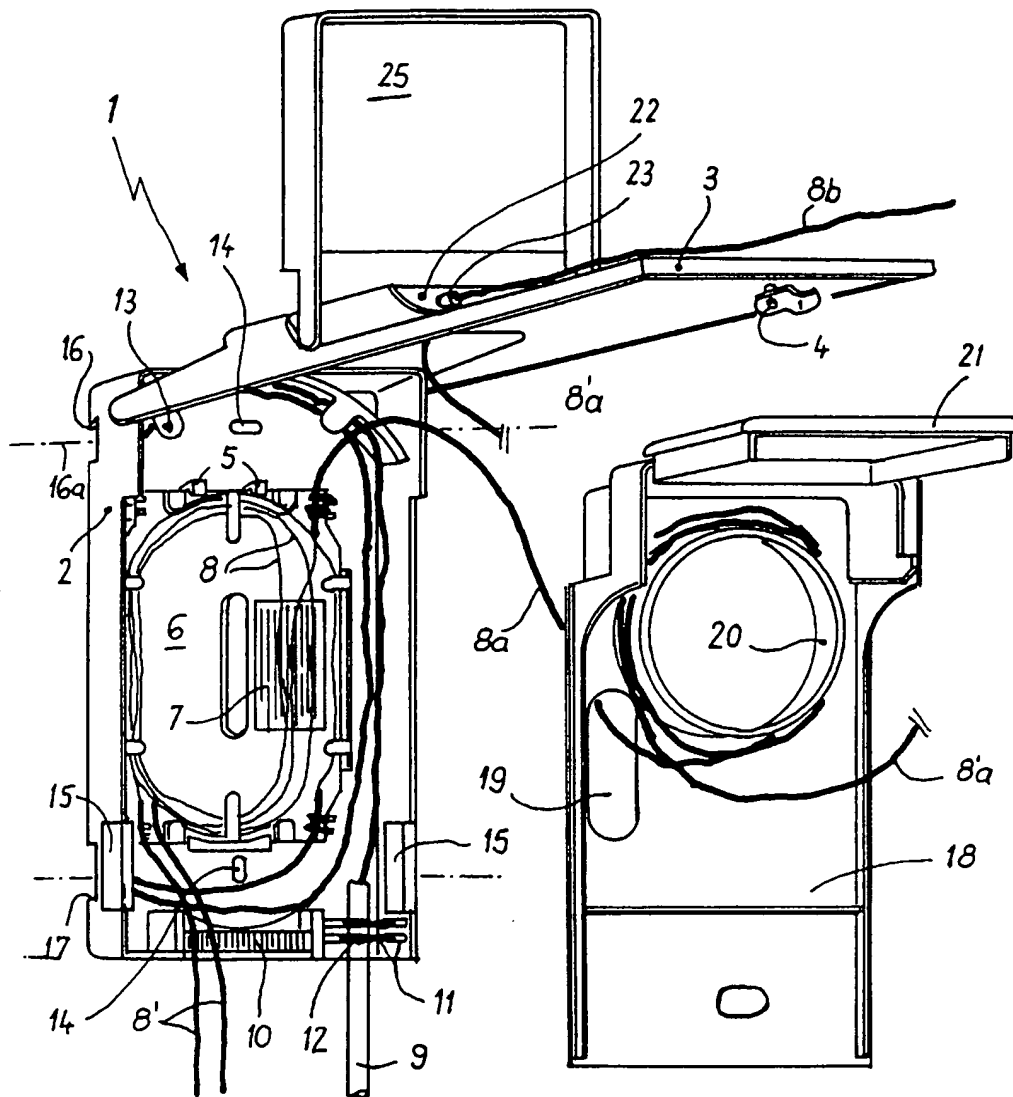
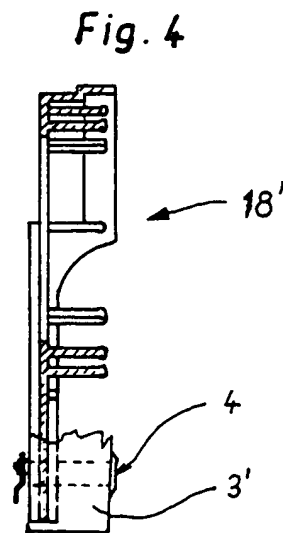
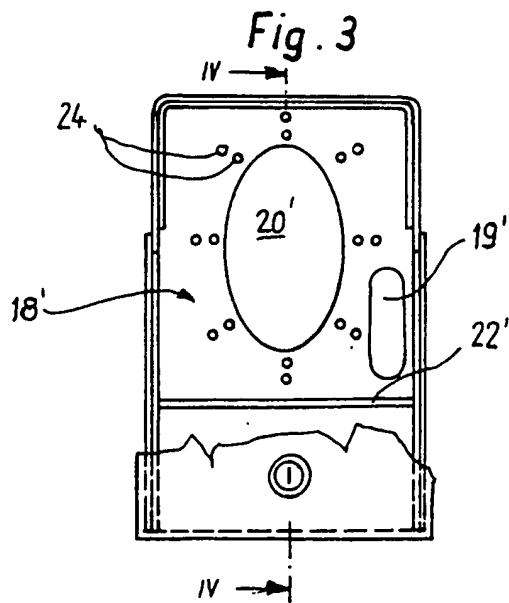
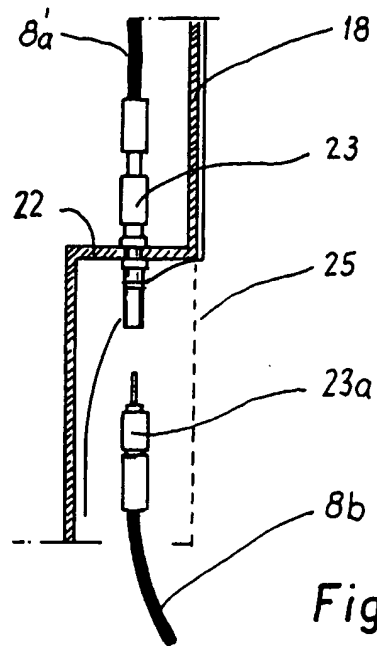


Fig. 1





European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 92 10 9429

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	FR-A-2 559 277 (SOCIETE HENRI POUYET) * claims 1,2; figures * ---	1-3	G 02 B 6/44
A	PATENT ABSTRACTS OF JAPAN vol. 7, no. 290 (P-245)(1435), 24 December 1983; & JP - A - 58162918 (FUJITSU K.K.) 27.09.1983 * abstract * ---	1	
A	US-A-4 976 510 (D.I. DAVILA et al.) * figures 2,4 * ---	1	
A	FR-A-2 517 076 (C.T.M.) * page 5, lines 3-29 * ---	1	
A	US-A-4 846 565 (ST. E. SWANSON) * figure 2 * ---	2-4,6	
D,A	EP-A-0 288 808 (REICHLE + DE MASSARI) * abstract; figure 1 * ---	3,11	
A	FR-A-2 586 827 (LIGNES TELEGRAPHIQUES ET TELEPHONIQUES) * figures 1,12 * -----	7	TECHNICAL FIELDS SEARCHED (Int. Cl.5) G 02 B
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 28-09-1992	Examiner FUCHS R
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document			